

## **Exhibit 15**

AFFIDAVIT OF PATRICK R. HANNON, Ed.D.

I, Patrick R. Hannon, Ed.D., declare the following:

1. I am an expert in the field of biomechanics and functional human anatomy.

I am the owner and principal consultant of Hannon Biomechanics Analysis in Fountain Hills, Arizona.

2. I received my Bachelor of Science from Northern Arizona University in Flagstaff, Arizona in 1969 with a major in physical education. In 1970 I received my Master of Arts in Exercise Science from Northern Arizona University. I received my Doctorate of Education in Biomechanics/Neuroscience in 1980 from Northern Colorado University in Greeley, Colorado.

3. My curriculum vitae, which reflects my education and experience, is true and correct [See curriculum vitae, attached hereto as Exhibit A].

4. At the request of counsel for Barry Lee Jones (Mr. Jones), I reviewed numerous case-related documents, examined pieces of physical evidence and visited scenes relevant to the case. I was asked to utilize the factual information and a functional anatomy-biomechanics analysis to determine the most probable movements of the driver occupant Mr. Jones and the front seat passenger, Rachel Gray within Mr. Jones's 1971 Ford van. I was also

asked to provide analysis regarding what would have been observable by two child witnesses, Reynaldo and Laura Lopez as Mr. Jones drove through the Choice Market parking lot. Finally, I was asked to examine the forces that potentially could have been applied by Mr. Jones while allegedly striking blows to the head/face and torso of Rachel Gray while driving with her in his van through the Choice Market parking lot.

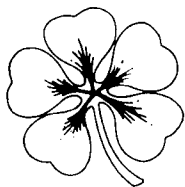
5. The materials I reviewed are listed in the report I prepared in this case are included in the report I prepared in this case. [See report attached hereto as Exhibit B].
6. My impressions and professional opinions set forth in my report of May 7, 2010 are true and correct and I incorporate that report in this sworn oath. [See report attached hereto as Exhibit B].

I declare under penalty of perjury under the laws of the United States of America and the State of Arizona that the foregoing is true and correct.

Executed this 14 day of May, 2010 in Phoenix, Arizona.

Patrick R. Hannon

Patrick R. Hannon, Ed.D.



## HANNON BIOMECHANICS ANALYSIS

*Dr. Patrick Hannon PC*

INJURY MECHANISMS • BIOMECHANICS, FUNCTIONAL ANATOMY, AND MEDICAL ANALYSES-CHART REVIEWS  
CIVIL AND CRIMINAL FORENSICS • AUTOPSY SERVICES • HUMAN FACTORS • BIOSIMULATIONS

ASSOCIATE EXPERT:  
**Michael Iliescu MD**  
LIC. IN ARIZONA AND  
WASHINGTON STATE

## Hannon Biomechanics Analysis WWW. Hannonbiomechanics.com

Hannon Biomechanics Analysis is a Phoenix area based Arizona Corporation, providing consulting services and expert witness testimony in detailed biomechanics, functional human anatomy, neurosciences, and medical analyses. When required, autopsies are also performed by this office. Our civil litigation casework includes over 1950 cases over 22 years including cases involving passenger motor vehicle accidents, large commercial truck accidents, pedestrian injuries, industrial injuries, human falls, surgical implant failures and sports/recreational injuries. Criminal forensics cases addressed include wrongful death, child abuse, shootings, beatings and vehicular homicide. Computer modeling of the human body is performed when required in a cost effective manner (both simulations and videos).

Our core expertise is injury biomechanics relating traumatic forces, moments and torques to tolerance limits for the head, spine and all other human anatomical sites. Injury analyses include medical chart reviews, human dynamics literature and product testing in cases involving personal injury. Hannon Biomechanics Analysis medical opinion is offered by Michael Iliescu MD.

Dr. Patrick R. Hannon has been funded by the National Science Foundation, the Air Force Office of Scientific Research and the Department of Defense. Dr. Hannon is a retired professor at Northern Arizona University, College of Engineering and Natural Sciences, Dept. of Biology. He held a tenured full time faculty position for 28 years at Northern Arizona University prior to retirement on May 15, 2008. Dr. Hannon has been awarded Associate Professor Emeritus status in May of 2009, Biology Dept., Northern Arizona University. Dr. Hannon has addressed hundreds of injury biomechanics, neurosciences and functional anatomy injury issues and has testified in civil and criminal cases in county, state and federal courts over the past twenty-one years. Dr. Hannon has co-authored the first textbook published in the United States in forensic biomechanics, entitled Forensic Biomechanics, (2006; 2008) Lawyers and Judges Publishing and additionally serves on the Board of Associate Editors for the new international journal entitled "Forensic Biomechanics".

Human factors issues are addressed by William Uttal Ph. D (see our web page).

Mechanical engineering issues can be addressed by Gene Baxter Ph. D. (see our web page).

Dr. Hannon has also worked and continues to work with numerous other mechanical, civil and structural engineers as well as automobile/truck/motorcycle accident reconstructionists who are ACTAR credentialed.

Affiliate: Bio-Sim.com - Intelligent simulations at [www.bio-sim.com/is](http://www.bio-sim.com/is)

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## **Dr. Patrick R. Hannon**

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Phone: 480-816-0930 • Fax: 480-816-0931 • Cell Phone: 928-607-0425 • E-mail: [Hannon@Hannonbiomechanics.com](mailto:Hannon@Hannonbiomechanics.com)

Physical Office Address in Scottsdale, Arizona

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### **BACKGROUND SUMMARY**

Dr. Patrick R. Hannon has over 20 years of experience in the field of injury-forensic biomechanics, human functional anatomy, and issues regarding human neuroscience. Dr. Hannon is an Associate Professor Emeritus at Northern Arizona University within the College of Engineering and Natural Sciences, Department of Biology. He has testified and qualified in both civil litigation and criminal matters. Dr. Hannon has co-authored a text book published in the United States in forensic biomechanics, entitled Forensic Biomechanics, (2006; 2008 Lawyers and Judges Publishing Co., Tucson, Arizona).

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### **EDUCATIONAL BACKGROUND**

<b>University of Northern Colorado</b>	1980
Greeley, Colorado	
Ed.D – Biomechanics/Neurosciences Emphases	
<b>Northern Arizona University</b>	
Flagstaff, Arizona	
M.A. – Exercise Science	1970
B.S. – Physical Education, Major/Geology, Minor	1969

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### **PROFESSIONAL EXPERIENCE**

<b>HANNON BIOMECHANICS ANALYSIS</b>	1988 to
CONSULTING PRACTICE	Present

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Hannon Biomechanics Analysis provides consulting services and expert witness testimony with a core expertise in injury biomechanics relating traumatic forces, moments and torques to tolerance limits for the head, spine and all other human anatomical sites. Injury analyses include medical chart reviews, human dynamics literature and product testing in cases involving personal injury. Expert resources include detailed biomechanics, functional human anatomy, neurosciences, medical analyses and human factors. When required, autopsies are also performed by this office. The civil litigation and criminal casework includes over 1,950 cases over eighteen years, including cases involving passenger motor vehicle accidents, large commercial truck accidents pedestrian injuries, industrial injuries, human falls, surgical implant failures and sports/recreational injuries. Criminal forensic cases addressed include wrongful death, child abuse, shootings, beatings and vehicular homicide. Computer modeling of the human body is also available. Medical opinions are addressed by Michael Iliescu, M.D.

We have acquired the General Motors Hybrid III biofidelic head form for drop tower impact. Coupled with a drop tower, we are able to collect force plate data and tri-axial accelerometry (Kistler piezoelectric) applicable to head injury cases.

**NORTHERN ARIZONA UNIVERSITY**, Flagstaff, Arizona  
**Associate Professor Emeritus** – BIOLOGY DEPARTMENT- Present Status

**NORTHERN ARIZONA UNIVERSITY**, Flagstaff, Arizona  
 TENURED ASSOCIATE PROFESSOR – BIOLOGY DEPARTMENT

1986 to  
 2008

My past research experience includes working in the Locomotion Laboratory in the Biology Department at the University. Much of the work was collaborative with biology, engineering and physical therapy professors. My publications and presentations range in diversity from the Journal of Biomechanics to Brain Research. The nature and extent of completed projects is indicated by the publications, presentations and abstracts listed herein.

My affiliation with Northern Arizona University as a retired tenured professor also allows for biomechanics, neuromechanics and functional anatomy work in our Northern Arizona University laboratory facilities in collaboration with colleagues in biology, engineering and physical therapy. The University has acquired a kinematics system from Skill Technologies (6D-Research system) which makes use of electromagnetic transmitters which generate near field, low frequency magnetic field vectors. This system allows us to produce real time graphics of human motion during experimental testing of exemplar subjects related to litigation. Furthermore, we have an EMED system which measures foot compression stresses and has value in gait mechanics as well as in other cases where precise

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compressive stresses must be measured during loading of the human body. Therefore, I am able to collect data which will address many different types of biomechanical issues related to civil injury litigation and criminal forensics.

Finally, I am able to make use of the NAU human cadaver laboratory in order to clarify issues related to structural and functional anatomy. This cadaver laboratory work is augmented by work with Dr. Michael Iliescu in assisting with autopsies.

**JEFFERSON MEDICAL COLLEGE**, Philadelphia, PA  
SABBATICAL – NEUROLOGY DEPARTMENT

January 1991 –  
May 1991

The Spring 1991 semester was spent in residence as a visiting faculty member.

**UNITED STATES AIR FORCE, BROOKS AIR FORCE BASE**, Texas  
FACULTY RESEARCH FELLOWSHIP AWARD

Summer 1989

Ten week contract for work in the Sustained Human Performance Laboratory examining factors which affect human performance along with endocrine hormone correlates.

**UNITED STATES AIR FORCE, WRIGHT-PATTERSON AIR FORCE  
BASE**, Ohio  
FACULTY RESEARCH FELLOWSHIP AWARD

Summer 1986

Ten week contract to work at the Armstrong Medical Laboratory, Biodynamics and Biomedical Engineering Division – modeling and Analysis Branch. This time was spent modeling and simulating human body movements within the Biodynamics Laboratory. This work included modeling human movement with the Articulated Total Body Model (ATB, Calspan Corp). The major focus of my faculty fellowship was on human kinematics and kinetics during emergency ejection from high performance aircraft.

**MONTANA STATE UNIVERSITY**, Bozeman, MT  
FACULTY EXCHANGE PARTICIPANT

1984 - 1985

My faculty exchange experience at Montana State University allowed me to work with Dr. Ellen Kreighbaum in biomechanics in the area of high speed filming of human motion and with Dr. Jim McMillan in neurophysiology.

**NORTHERN ARIZONA UNIVERSITY**, Flagstaff, AZ  
ASSISTANT PROFESSOR –School of Health Professions

1980 - 1985

**MIDDLE TENNESSEE STATE UNIVERSITY**, Murfreesboro, TN  
ASSISTANT PROFESSOR OF PHYSICAL EDUCATION

1974 - 1980

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One year leave of absence from Middle Tennessee State University to complete the doctoral requirements for residence at the University of Northern Colorado; year was spent as the Graduate Research Assistant in the Motor Control/Neurosciences Laboratory at UNC

**MIDDLE TENNESSEE STATE UNIVERSITY**, Murfreesboro, TN 1972 - 1975  
INSTRUCTOR OF PHYSICAL EDUCATION

**THE UNIVERSITY OF IOWA**, Iowa City, Iowa 1971 –  
GRADUATE ASSISTANT IN EXERCISE SCIENCE June 1972

**EXPERT WITNESS WORK** **INJURY BIOMECHANICS, FUNCTIONAL ANATOMY** 1988 to Present  
APPROXIMATELY 1,950 CASES

I have been qualified and have testified as an expert witness in the area of biomechanics and functional anatomy in Maricopa County, AZ, Pima County, AZ, Coconino County, AZ, Los Angeles County, CA (Federal Court), Clark County, Nevada, Daviess County, Missouri, Dallas Texas and in San Diego County, California, (Federal Court)

My work in criminal forensics includes testimony as an expert witness for the United States Dept.. of Justice, the United States Attorney's Office, the State of Arizona Attorney General's Office, the State of Arizona Public Defender's Office, the Maricopa County, AZ Public Defender's Office, Clark County, Nevada, Pinal County, AZ Public Defender's Office and the Maricopa County, AZ Attorney's Office.

Depositions and interviews: Approximately 200 appearances

Trial Testimony: Approximately 95 appearances

Arbitrations: Approximately 12 appearances

**RESEARCH AND TRAINING EXPERIENCE** Please note that my academic research is focused in biomechanics, functional anatomy, and the neurosciences. Biomechanics research and my past teaching responsibilities include undergraduate and graduate biomechanics and functional human anatomy and underlie my qualifications regarding the evaluation of these issues related to accidents and criminal forensics. I have received biomechanics and neurosciences funding (see grants) from

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the National Science Foundation (principal investigator and project director), the United States Air Force Office of Scientific Research (principal investigator) and the United States Department of Defense.

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**PUBLICATIONS,  
ABSTRACTS and  
PRESENTATIONS**

**BIOMECHANICS and NEUROSCIENCES:**

**Refereed Publications**

1. Rasmussen, Stanley A. Goslow, George E. Jr., and Hannon, Patrick R. (1984). "Mirrored three-view cinematography in small animal locomotion studies." Research Quarterly for Exercise and Sport, 55, (2), pp. 201-205.
2. Hannon, Patrick R., Rasmussen, Stanley A., and DeRosa, Carl P. (1985). "Electromyographic patterns during level inclined treadmill running and their relationship to step cycle measures." Research Quarterly for Exercise and Sport, 56, (4), pp. 334-338.
3. Saczalski, Ken and Hannon, Patrick. (1988) "Multi-variable effects of side impact passive occupant protection materials". Presented at the Society of Automotive Engineers Meeting, Detroit, Feb.29-March 4, 1988. Paper in its entirety published in the SAE Proceedings- 1988 (13pp).
4. McMillan, James A., Hannon, Patrick, Stevenson, Leticea M., and Van Natta, Timothy L. (1991). "Effects of body position on crossed extension reflex in decerebrate cat: rectus femoris is more sensitive than is vastus medialis". Brain Research, 538, pp. 152-156.
5. Sanford, Britt, Beacham, Sabrina Beacham, Hanifin, John, Hannon, Patrick, Streletz, Leopold, Sliney, David, and Brainard, George. (1996) "The effects of ultraviolet-A radiation on visual evoked potentials in the young human eye", Acta Ophthalmologica Scandinavica vol. 74 pp. 553-557.
6. Youberg, D. L., Cornwall, M. W., McPoil, T.G. and Hannon, P.R. (2005) "The amount of rearfoot motion used during stance phase of walking" Journal of American Podiatric Medical Association 95 (4): 376-382.

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**Published Reports:**

Hannon, Patrick R., and Jansen, David (1986) "Modeling of Human Body Movement" - Report submitted to and published by the Air Force Office of Scientific Research, 1986 USAF - UES Summer faculty Research Program.

**Books and Book Chapters:**

**CHAPTERS:**

Hannon, Patrick and Knapp, Kerry, (2003) **Causes of Injury: A review of the low-impact, human subject literature.** Ch. 18; in the new 3<sup>rd</sup> Ed. of **Low Speed Automobile Accidents**, Watts, A.J., Atkinson, D. and Hennessy, C., Lawyers and Judges Publishing Co., Tucson, Arizona.

Hannon, Patrick (2009) **Forensic Biomechanics-Motor Vehicle Accidents (Ch. 10) In The Claim Adjuster's Automobile Liability Handbook ; Editor- Steve Plitt , West Thomson Reuters Professional Pub. November, 2009**

**BOOKS:**

Hannon, Patrick and Knapp, Kerry, (2006; 2008) **Forensic Biomechanics**, Lawyers and Judges Publishing Co., Tucson, Arizona.

**Presentations and Abstracts:**

1. Hannon, Patrick R., Rasmussen, Stanley A., and DeRosa, Carl P. (1984). "Electromyographic patterns during level and inclined treadmill running and their relationship to knee flexor extensor strength ratios". International Journal of Sports Medicine 5:163.
2. Hannon, Patrick R., McMillan, James A., and Stevenson, Lisa, 1985. "Differential contributions of vastus medialis and rectus femoris to crossed extension reflex: affects of body position" Presented by Dr. Hannon at the Society for Neurosciences Convention, Oct., 1985.
3. McMillan, James A., Hannon, Patrick R., and Stevenson, Lisa. 1985. "Differential contributions of the rectus femoris and vastus medialis to crossed extension reflex: prolonged central summation" Presented by Dr. McMillan at the Society for Neurosciences Convention Oct., 1985.

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The last two presentations are the result of work completed at Montana State University in 1984 - 1985. Supported by National Science Foundation Grant #ISP - 8011449 and NIH Grant #RR08218.

4. Hannon, Patrick "Advances in kinematics and kinetics measurements of human performance"- Orthopedics Update sponsored by the Arizona Physical Therapy Association, Jan 17, 1989, Phoenix, Az.
5. Hannon, Patrick "Kinematics and Kinetics of Human Motion" April, 1991 presented at Neurology Grand Rounds, Jefferson Medical College, Philadelphia, PA.
6. Hannon, Patrick, Fukumoto, David, Fleming, Scott, Pappas, Angelo "Variant and invariant characteristics of the human step cycle during speed and grade perturbations" Funded by the National Science Foundation - Integrative Neural Sciences Division, Feb. 1986, BSN-86-09779, American Society of Biomechanics, October, 1991, Tempe, Arizona- presentation at the National meeting and published in the Journal of Biomechanics.
7. Hannon, Patrick "Injury Biomechanics and Vehicle Accidents" Presented to the Northern Arizona University Chapter of the Society of Automotive Engineers, Feb., 1992.
8. Hannon, Patrick "Injury Biomechanics under high and low loading" Presented to the College of Health Professions, Northern Arizona University, Oct. 1994.
9. Hannon, Patrick, McClean, Ian, A cadaver study of cervical and lumbar intervertebral disk morphology. Presented at the College of Health Professions Honors Day, April 2001.
10. Hannon, Patrick – Current Topics in Functional Anatomy and Biomechanics – SATAI Conference, Newport Beach, California, November 2000. Co-presented with Kerry Knapp.
11. Hannon, Patrick- Biomechanical Contributions to Criminal Forensics presented at the Coconino County "Death Investigation Seminar" Presented by the Coconino County Medical Examiner's Office, April 2003.
12. Biomechanics of Traumatic Brain Injury – Presented August 14, 2006 at the Southwest Association of Traffic Accident Investigators, Phoenix, Arizona. Co-presented with colleague Michael Iliescu MD.

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13. Hannon, Patrick "The Role of the Expert Witness in Wrongful Death Claims" Presented at the National Business Institute Presentation of TRYING THE WRONGFUL DEATH CASE IN ARIZONA, Oct 11, 2007 CLE- 6.0 units
14. Hannon, Patrick " The role of Biomechanics in Criminal Investigations" presented to Criminal Justice class "Death Investigation" Scottsdale Community College; Sept. 27, 2008.
15. Hannon. Patrick "Forensic Biomechanics" Presented in a Crime Scene Seminar –Criminal Justice class- Scottsdale Community College, Feb. 20, 2009.

Other publications in the neurosciences are available upon request

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**GRANT  
HISTORY**

**HUMAN BIOMECHANICS**

1. Start up funding from Northern Arizona University.  
Hannon, Patrick - Northern Arizona University Organized Research four years of funding 1981 - 1983 and 1986 - 1988. Funded- Approximately \$40,000 in total- Area of research: Biomechanics
2. 1986 "Equipment Proposal for Biomechanics/Motor Control Laboratory at Northern Arizona University" Six mini - proposals were submitted as part of this proposal package, **Project Director:** Dr. Patrick Hannon, - National Science Foundation - Integrative Neural Sciences Division, Feb. 1986, BSN-86-09779, \$35,700 funded for the WATSMART Spatial analysis system. The computer configuration to drive the WATSMART System was acquired through Northern Arizona University Organized Research funding (\$9,000), Sept. 1986. Funded
3. 1986 Hannon, Patrick - AFOSR/United States Air Force Summer Research Program - Funded for summer salary and expenses. Funded (\$9,600), (1986) Area of Research: High performance aircraft emergency seat ejection.
4. Hannon, Patrick Principal Investigator, Knapp, Kerry Co-investigator: Integration and examination of EMG motor patterns, force measures and three dimensional kinematics in human arm and forearm movement- submitted September 2000 to Office of Naval Research-Science and Technical Research Program: Cognitive, Neural and Biomolecular Biomimetic Robotics (\$158,873) – Not funded. Neurosciences

**National grants funded in the area of Neurosciences are available by request.**

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WORKSHOPS  
AND  
CONFERENCES

1. 19th Annual International Workshop on Human Subjects for Biomechanical Research, San Diego, Cal., Nov. 17, 1991.
2. 35th Annual Stapp Car Crash Conference San Diego, Calif. Nov. 18-20, 1991.
3. Musculo-Skeletal Biomechanics, Prosthetics, and Robotics Workshop, Feb. 19, 1994 College of Medicine, University of Arizona.
4. Southwestern Association of Traffic Accident Investigators Symposium July 20-21, 1995 Phoenix, Arizona (Low Speed Rear-end Collisions).
5. Users symposium for experienced users of the Articulated Total Body Computer Model- Phoenix, Arizona-, Feb. 9, 1996.
6. Southwestern Association of Traffic Accident Investigators Symposium March 29 and 30, 1996, Las Vegas, Nevada
7. Southwestern Association of Traffic Accident Investigators Symposium; Low-Speed Impact Dynamics / Human Factors; April, 1997 Las Vegas, Nevada
8. Southwestern Association of Traffic Accident Investigators Symposium July 17-18, 1998 Phoenix, Arizona (Training course Staged Collision Sequence #17/Motor cycle Dynamics/Vehicle Aerodynamics)
9. Southwestern Association of Traffic Accident Investigators Symposium -Attitude, Perspective and Integrity in Accident Reconstruction / Linear Momentum: Facts and Myths; Southwestern Association of Technical Accident Investigators; Laughlin, Nevada March 1999
10. Southwestern Association of Traffic Accident Investigators Symposium July 16 and 17, 1999 Phoenix, AZ (Training course Staged Collision Sequence Vehicle/truck Underride Data Collection, Sleep Apnea and MVAs, and Antilock Brake Performance.
11. Southwestern Association of Traffic Accident Investigators Symposium March 14 and 15, 2000 Laughlin, Nevada- Training in yaw vehicle dynamics during braking and uncontrolled vehicle acceleration

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12. Southwestern Association of Traffic Accident Investigators Symposium, July 14-15 2000 Phoenix, Arizona. Speaker-Dept. of Transportation Crash Testing and Occupant Protection
13. Southwestern Association of Traffic Accident Investigators Symposium, Nov. 2000 Current Topics in Functional Anatomy and Biomechanics – SATAI Conference, Newport Beach, California, November 2000. Presenters- Patrick Hannon and Kerry Knapp
14. Southwestern Association of Traffic Accident Investigators Symposium March 2001 Las Vegas, Nevada- Tire construction and failure; Momentum analyses
15. Arizona Homicide Investigators Association, Inc. August 2001, Payson, Arizona Blunt Force Trauma, Speaker: Dr. Mark Fischione,
16. Southwestern Association of Traffic Accident Investigators Symposium March 2002 Las Vegas, Nevada- Commercial vehicle braking and human factors analysis
17. Arizona Homicide Investigators Association, July 2003, Phoenix, Arizona – Sexual Related & Medicolegal Death Investigation Seminar, Speakers: Dr. Michael Baden, M.D. and Vernon Geberth
18. State of Arizona Ergonomics Workshop- Risk Management Section, Flagstaff, Arizona January 22, 2004.
19. Southwestern Association of Traffic Accident Investigators Conference July 2005 Crush Analysis in Motor Vehicle Accidents- July 15-16 Phoenix, Arizona.
20. Southwestern Association of Traffic Accident Investigators Conference July 2006- attendance- July; Phoenix, Arizona.
21. Southwestern Association of Traffic Accident Investigators Conference July 2007- attendance- July; Phoenix, Arizona.
22. Southwestern Association of Traffic Accident Investigators Conference March, 2008 Laughlin, Nevada- Energy Analysis of Vehicle Accidents
23. Southwestern Association of Traffic Accident Investigators Conference July, 2008 Phoenix - Arizona

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24. Southwestern Association of Traffic Accident Investigators Conference March 13-14, 2009. Laughlin, Nevada. Motorcycle Braking Abilities-Motorcycle Crush Analysis Crash Avoidance/Motorcycle Safety/Evaluating Motorcycle Rider Response
25. Southwestern Association of Traffic Accident Investigators Conference July 10-11, 2009. Glendale, Arizona. Biomechanical Analysis of Rollover Crashes, Seat Belts in Rollover Crashes, MADYMO in Reconstruction /Rollover Crash Test

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During my tenure at Northern Arizona University- 28 years:

**TEACHING  
RESPONSIBILITIES**

1. Functional Anatomy and Kinesiology (Undergraduate level)
2. Biomechanics (Undergraduate and Graduate level)
3. Forensic biomechanics- Biology 300 –A five week course offered to Northern Arizona University students
4. A two hour lecture presentation to the Forensic Pathology class in Criminal Justice- Fall semesters (functional anatomy and forensic biomechanics)

Former teaching responsibilities include 25 years of teaching a senior/graduate level neurosciences course (Neural Control of Movement)

Additional course work taught includes graduate level **research design and statistics**.

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**MASTER'S  
THESES  
CHAired**

1. Van Demark, Cheryl (1992) Scapular Posture and Strength of the Scapular Musculature: A Relationship Study
2. Tsutsumi, Toshito (1992) Effects of Mental Practice and Relaxation Technique upon isokinetic strength performance
3. Hails, Dale (1992) The Effects of Strengthening of Scapular Retractors and Lengthening of Pectoral Muscles on Postural Alignment

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**GRADUATE  
PROJECTS CHAired**

Knapp, Kerry (1995) Modeling Human Response in Low Rear Impact Collision

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**MASTER'S  
THESES  
COMMITTEE  
MEMBER**

1. Youberg, Linda (2000) Passive and Dynamic Motion of the Subtalar Joint
2. Ganley, Kathleen (1996) Effects of supramalleolar orthoses on stance in children with Down Syndrome
3. Sawert, Mary (1995) The validation of two-dimensional measurement of tibial rotation using three-dimensional movement analysis
4. Cimaglia, Richard (1994) Hemoglobin desaturation during running and cycling in highly trained duathletes
5. Hopson, Margaret (1992) Motion of the first metatarsophalangeal joint: reliability and validity of measurement techniques

**PROFESSIONAL  
ASSOCIATIONS**

1. Society for Neurosciences- National-by nomination and application
2. American Society of Biomechanics-National-by nomination and application
3. Society of Automotive Engineers-National-by nomination and application
4. International Brain Research Organization-by nomination
5. Southwestern Association of Traffic Accident Investigators-by application
6. Arizona Homicide Investigators Association

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**OTHER  
PROFESSIONAL  
ACTIVITIES**

Textbook reviewer for Lippincott Williams & Wilkins Publishers, Philadelphia  
Functional Human Anatomy

Nov. 2009 -Selected as a Research Paper reviewer and selected to serve on the Associate Board of Editors for the international journal entitled the "Journal of Forensic Biomechanics" Ashton Publishing- Associate Board of Editors: 2010- 2013. One of approximately 10 board members nationwide (approximately 25 worldwide).

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## Hannon Biomechanics Analysis

Michael Iliescu, MD

Curriculum Vitae

Licensed in Arizona and Washington State

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## EDUCATION

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1999-2000      **Broward County Medical Examiner's Office**  
Fellowship in Forensic Pathology

1995-1999      **Winthrop University Hospital, NY**  
AP/CP resident

1977-1983      **Medical Institute of Timisoara, Romania**  
Doctor of Medicine

## HONORS AND AWARDS

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1977-1983      **Timis Scholar-Tuition Scholarship**  
Timis State Higher Education Coordinating Board. Award recognizing academic achievement and leadership activities of two university students per legislative district

## EMPLOYMENT HISTORY

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2005-Present      Hannon Biomechanics Analysis  
Principal- Forensic Pathology (Medicine)

2007-2008      **King County Medical Examiner's Office**  
Assistant medical examiner  
*-performed forensic autopsies*  
*-participated in the development and implementation of new/improved forensic protocols used during death investigation-presented at KCMEO conferences -*  
*coordinated with the Department of Health follow up investigation in infectious disease*

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*related deaths-participated in the management of a mass fatality incident (Yakima airplane accident)*

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- 2006-Present      **US Department of Health and Human Services**  
Training officer for NDMS-DMORT team 9  
*-coordinated mass disaster management team on the federal level*  
*-organized and supervised training exercise for a team of 93 members covering the states of AZ, CA, NV and HI*  
*-participated in development and implementation of standard morgue operating procedures for DMORT-9 team*
- 
- 2005-Present      **Scottsdale Community College**  
Adjunct faculty  
*-Teaching two web-based forensic pathology classes*  
*-Provide students with career advice and guidance*
- 2002-12/2003      **Coconino County Medical Examiner's Office**  
Associate Medical Examiner  
*-performed forensic autopsies*  
*-participated in the development and implementation of new/improved forensic protocols used during death investigation*  
*-presented and organized two Death Investigation seminars for local and federal law enforcement agencies*  
*-participated at weekly management meetings with Department of Health division managers*  
*-participated and supervised in two mass fatality incidents (airplane accidents)*  
*-managed budget, personnel, supplies, contracts and supervised a staff of three and 3 interns*
- 2000-01/2002      **Maricopa County Medical Examiner's Office**  
Associate Medical Examiner  
*-performed forensic autopsies*  
*-participated in the development and implementation of new/improved forensic protocols used during death investigation*  
*-coordinated with the Department of Health follow up investigation in infectious disease related deaths*  
*-participated at weekly management meetings*
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- 1983-1991      **Tomnatic Medical Clinic (Romania)**  
Family Practitioner and clinic director  
*-supervised the work of county staff paraprofessional staff for development and implementation of personal health services and programs such as: Immunizations, Healthy Pregnancy, Family Planning and Healthy Infant programs*  
*-managed budget, personnel, supplies, contracts and supervised a staff of seven*  
*-coordinated with state and municipal health department planning for health services*
- December, 1989      **City of Timisoara Department of Health**  
Department Head  
*-coordinated with municipal authorities health planning and implementation of personal health services for a population of 250,000*  
*-managed budget, personnel, supplies, contracts and supervised a staff of 19*

## **TEACHING EXPERIENCE**

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- 2007-Present      **Advisory board member, forensic section**  
University of Washington Extension, Forensics program
- 2005-Present      **Adjunct Faculty**  
Scottsdale Community College – Administration of Justice Department  
*-Teaching two web-based forensic pathology classes*  
*-Provide students with career advice and guidance*
- 2003-2004      **Adjunct Faculty**  
Northern Arizona University – Administration of Justice Department  
*-Taught a Forensic Pathology class*  
*-Provided students with career advice and guidance*
- 2004      **Adjunct Faculty**  
Coconino Community College – Administration of Justice Department  
*-Taught a Forensic Pathology class*  
*-Provided students with career advice and guidance*

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- 1994-1995      **Instructor**  
South Seattle Medical Assistant/Phlebotomist Academy  
*-Taught Anatomy and Physiology classes, including one anatomy lab*  
*-Provided students with career advice and guidance*
- 1990-1991      **Assistant Professor**  
Medical University of Timisoara, Romania – Biochemistry Department  
*-Taught Biochemistry classes and laboratory*  
*-Provided students with career advice and guidance*
- 1989-1990      **Assistant Professor**  
*-Medical University of Timisoara, Romania - Anatomy Department*  
*-Taught anatomy lab for medical students*

#### **PRESENTATIONS AND LECTURES**

---

Michael Iliescu, MD and other speakers. "NTSB mass fatality incident management."  
Organized and presented at NDMS, DMORT-9 annual training, 2007

Mary Dudley, MD and Michael Iliescu, MD. "Forensic Medical Investigation,  
Comprehensive Review." Phoenix, Kansas City and Atlantic City, 2006 and 2007.

Michael Iliescu, MD. "Katrina Mission, how identification of the victims was made."  
Seminar organized and presented at Scottsdale Community College, 2006

Michael Iliescu, MD. "Biomechanics of motorcycle accidents." With Dr. Patrick Hannon  
"Brain Injuries" Southwestern Association of Traffic Accident Investigators Symposium,  
2006

Michael Iliescu, MD. "Role of the medical examiner in death investigation." Chandler  
Citizens Police Academy, 2005 and 2006

Michael Iliescu, MD. "Death Investigation." Organized and presented for Arizona Funeral  
Home Directors Association, 2004 and 2005

Michael Iliescu, MD. "Role of the medical examiner in death investigation." Flagstaff  
Citizens Police Academy, 2002 and 2003

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Michael Iliescu, MD. "Death Investigation Methodology." Seminar organized and presented for Coconino County Law Enforcement Agencies, Flagstaff, 2001

Michael Iliescu, MD. "Death Investigation Methodology." Seminar organized and presented for National Park Services and Coconino County Sherriff's Office, Tusayan, 2002

Michael Iliescu, MD. Firefighter autopsy protocol. The American Academy of Forensic Sciences Annual Meeting, Feb. 2001, Seattle

Michael Iliescu, MD. Death Investigation seminar presented at Alaska Peace Officers Association meeting, June 2009.

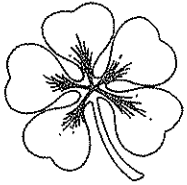
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#### **MEMBERSHIPS/LICENSES**

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2007	<b>American Academy of Forensic Sciences, applicant</b>
2006	<b>Southwestern Association of Traffic Accident Investigators</b>
2007	<b>Medical license in Arizona and Washington states</b>

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## HANNON BIOMECHANICS ANALYSIS

*Dr. Patrick Hannon PC*

INJURY MECHANISMS • BIOMECHANICS, FUNCTIONAL ANATOMY, AND MEDICAL ANALYSES-CHART REVIEWS  
CIVIL AND CRIMINAL FORENSICS • AUTOPSY SERVICES • HUMAN FACTORS • BIOSIMULATIONS

May 7, 2010

ASSOCIATE EXPERT:  
*Michael Iliescu MD*  
LIC. IN ARIZONA AND  
WASHINGTON STATE

Ms. Sylvia J. Lett  
Federal Public Defender  
Capital Habeas Unit  
407 W. Congress St.  
Suite 501, Tucson, Arizona 85701

**Re: State of Arizona v. Barry Lee Jones**

Dear Ms. Lett:

In accordance with your request, I have prepared this report outlining my opinions in this matter. My role has been to utilize the factual information at hand and a functional anatomy-biomechanics analysis to determine the most probable kinematic description (movements) of the driver occupant Barry Jones and Rachel Gray (age four) who was a front seat passenger occupant within the 1971 Ford van. The description of the movements of Barry Jones is also examined from an analysis perspective of what would have been observable by the Lopez fraternal twins (Reynaldo and Laura Lopez) as Barry Jones drove through the Choice Market parking lot. Furthermore, I have examined the forces that potentially could have been applied by Barry Jones during alleged striking blows to the head/face and torso of Rachel Gray while he was driving through the Choice Market parking lot.

The foregoing summary opinions and conclusions are based on the information available to me at this time. I reserve the right to consider any information that may become available at a later date and if necessary author a supplemental report.

A copy of my curriculum vita is attached to this report.

Patrick Hannon Ed. D  
Hannon Biomechanics Analysis

**Key Terms:**

Velocity	=	A displacement over time (speed in mph and direction)
Kinematics	=	A description of body motion or body position
Kinetics	=	Causal factors of body motion (ie. loading)
Loading	=	The "forces", "torques" and "moments" that produce body motion and/or deform materials (human tissues in this case).
DOI	=	Date of Incident

**DOI: May 1-2, 1994**

**Reviewed:**

Police interview of Laura Lopez on May 3, 1994;  
 Pretrial interview of Laura Lopez on January 20, 1995;  
 Trial testimony of Laura Lopez on April 7, 1995;  
 Police interview of Reynaldo Lopez on May 3, 1994;  
 Pretrial interview of Reynaldo Lopez on January 20, 1995;  
 Trial testimony of Reynaldo Lopez on April 7, 1995;  
 Police interview of Norma Lopez on May 3, 1994;  
 Trial testimony of Norma Lopez on April 7, 1995;  
 Interview with Judy Chavez on May 19, 1994 by Detectives Rankin and O'Conner;  
 Letter from Barry Jones to appellate counsel Harriett Levitt (undated);  
 Rachel Gray's autopsy report dated May 3, 1994;  
 Rachel Gray's Kino Community Hospital records;  
 Trial testimony of Dr. John Howard on April 12, 1995;  
 Trial testimony of Dr. John Howard at Aggravation/Mitigation hearing on June 13, 1995;  
 Trial testimony of Dr. Steven Seifert on April 6, 1995;  
 Diagram of the area around Choice Market drawn by Barry Jones in 2008;  
 Copies of 2 color photos of poster board diagram (Exhibits 134 and 135) of Rachel Gray's injuries used during Dr. John Howard's testimony;  
 All case photos taken by the Pima County Sheriff's Department, including autopsy photos, photos of the van and photos taken around the Choice Market area;  
 Photos taken of the van and the area surrounding Choice Market in 2008 by Mr. Paul Gruen;  
 Report of the Arizona Dept. of Corrections Information Page 114690 for Barry Jones;  
 Animation prepared by Mr. Paul Gruen;  
 Final Report of Mr. Paul Gruen, February 25, 2010;

Examination of one exemplar pry bar;  
 Map drawn by Barry Jones (date unknown);  
 Site visit to Choice Market parking area in Tucson at 3650 E. Benson Highway –P. Hannon, June 3, 2009;  
 Examination of 1972 Ford van operated by Barry Jones at the Pima County Impound lot on East Ajo-Dr. Patrick Hannon, October 27, 2009;  
 Scientific Examination Report by Ed Lukasik dated Oct. 20, 1994, Central Regional Crime Lab.;  
 County Sheriff's Office impound yard on East Ajo;  
 Barnett Investigations, Inc., George E. Barnett, P.I. Report of May 31, 1995 (with photographs);  
 Report of Dr. Janice Ophoven dated April 20, 2009;  
 Report of Dr. Janice Ophoven dated Feb. 1, 2010 ;  
 Report of Dr. Mary Pat McKay dated 10/29/2009;  
 Discussion with Mr. Paul Gruen; Nov. 24, 2009;  
 Elementary School records for Reynaldo Lopez with weight and height- 1994 and 1995;  
 Sunnyside Unified School District.

### **Vehicle Motion and Observation Analysis**

Barry Jones' van motion was described by the two eight year old Lopez children and has been simulated by Mr. Paul Gruen, an ACTAR certified accident reconstructionist. Although the precise speed of the Ford van will never be known, given the terrain of parking lot, a vehicle velocity of approximately 15 to 20 miles per hour in an approximate northeast direction is a reasonable upper velocity magnitude limit in order to maintain driver occupant control (Mr. Paul Gruen, 1/23/2010 report; pp. 3 and 5). This velocity estimate is consistent with the descriptions of the two Lopez children. The resulting time of quality observation (upper limits) for the two Lopez children would be on the order of approximately two to four seconds (Mr. Paul Gruen, 1/23/2010 report; p. 5). This time frame (time epoch) could have been significantly reduced depending upon when the Lopez children first noticed the moving van. Furthermore, the children's observation of the moving van could have been significantly compromised due to the rough parking lot surface and the moving bouncing van (Discussion with Mr. Paul Gruen, Nov. 24, 2009). Observation by the Lopez children would have been initially through the van windshield and then at a later point in time through the side driver's door window next to where Barry Jones was sitting. Factors such as changing angles of the children's line of sight relative to the X and Y axes of the vehicle, reflected light contrast, vehicle obstructions (e.g. vehicle A

pillars- [metal member joining the windshield to the driver's and passenger's side windows]), the general lighting environment and the positions of Barry Jones and Rachel Gray within the vehicle relative to the vehicle dashboard and the driver's side door panel prevented a clear unambiguous observation by the two Lopez children. Laura Lopez indicated that the windows of the van were in the up position (p. 10, Detective Clark interview). The last time point of the children's observation represents an estimated 26 foot displacement (distance) between where the two Lopez children indicate they were standing and the driver's side door of the Barry Jones' Ford van. All other observations made by the Lopez children necessarily would have had to occur at a greater linear displacement (distance). After the van passed by this point of minimum displacement, it would very rapidly move out of an area where the Lopez children would have been in position to observe any additional movements of Rachel Gray or Barry Jones. Furthermore, the driver's side B pillar of the Ford van [metal member which joins the driver's side window and the rear adjacent side window] and the seat backs of the Ford van would have precluded clear observation by the children of occupants Barry Jones and Rachel Gray through the side windows.

### **Descriptions of the Kinematics of Laura and Reynaldo Lopez**

Laura Lopez (age eight at DOI) indicated during her May 3, 1994 interview with Detective Clark that the Barry Jones struck the little girl with his elbow two times to her face (pp. 10-13) as she was sitting next to her passenger's side door (p. 21). Laura Lopez indicated that she could see the head of the little girl but the "rest of it" [referring to the little girl's body] was hidden by the door (p. 8). In her interview with defense counsel January 20, 1995, Laura Lopez indicated that she could see all the way down to the top of the pants of the Barry Jones (p. 9). During trial testimony, Laura Lopez indicated that she did not see the face of the little girl (p. 36). This statement is contradicted by Laura Lopez on page 38 of her trial testimony where she testified that she could see the little girl crying. Laura Lopez indicates that she observed the striking actions of Barry Jones through the windshield [front window] (p. 43; trial testimony). However, during trial testimony, Laura Lopez states that her face [little girl] was not higher than the windows (p. 44; trial testimony). Laura Lopez also indicated in defense counsel's interview that the van did not have windows going all the way back (p. 6). Please note that Barry Jones' 1971 Ford van does have windows going all the way back (see Appendix I).

Reynaldo Lopez (age eight at DOI and a height of approximately 50-51 inches) in his interview with Detective Clark, May 3, 1994 indicated that he saw Barry Jones strike the little girl three times with his fist (two times in the face and one time in stomach) (p.

10). Reynaldo Lopez's approximate height is based upon 1994-95 school records (Sunnyside Unified School District). Reynaldo Lopez indicated that Barry Jones also hit the little girl in the mouth with his elbow [note testimony not completely clear; this elbow strike may have been included in the three total strikes]. Reynaldo Lopez later indicated that he could not picture where on Rachel's body she was struck by Barry Jones' elbow (p. 12; Detective Clark interview). In defense counsel's interview-(Leslie Bowman of Reynaldo Lopez on January 20, 1995), Reynaldo Lopez indicated that strikes were made to the face and stomach of the little girl (p. 11). He further indicated during this defense counsel interview that he does not know how many times the little girl was hit (p. 12). Reynaldo Lopez indicated that he would have been able to count to ten in terms of the time that he was able to observe the little girl in the van [after alerted by his sister Laura] (defense counsel interview; pp. 23-24). During trial testimony, Reynaldo Lopez indicated that he saw three strikes to the little girl (p. 11) and Barry Jones' fist (backhand) to her chest (p. 12). Reynaldo Lopez further described Barry Jones striking the chest of the little girl with his elbow (trial testimony; p. 13). Reynaldo Lopez stated that he made his observations as the van was moving towards him and his sister and that the observation of the van occupants was through the side window of the [approaching] van (trial testimony; pp. 24-25).

Clearly, there are inconsistencies in the interview and testimony statements of the two Lopez children. However, the intent of this report in accord with my charge in this matter is to address the issues directly related to biomechanics/functional anatomy, line of sight, etc. Those issues are addressed below.

### **Kinematics Analysis**

On October 27, 2009, I was able to observe, take various measurements and photographs of the 1971 Ford van operated by Barry Jones on May 1, 1994. Investigator Sowards and I were not able to move the van from its place of rest within the impound lot. Necessarily then, some photographs on 10/27/2009 were taken of the passenger's side door and side window (unobstructed by other vehicles within the impound lot) as opposed to the driver's side window. However, one can extrapolate the findings of my observations and photographs to the driver's side of the 1971 Ford van as both windowsills are approximately 15 inches above the seat pan of each respective seat. At the time of this incident Rachel Gray was approximately 40 inches tall and weighed 28 pounds. Her sitting height based upon normative pediatric data would have been approximately 21 inches which equates to six inches above her passenger door windowsill. If Rachel Gray was kneeling on the seat, she would have raised herself to a

higher but undetermined level. It is not reasonable to assume that Rachel Gray would have been standing on her seat as the motion of the moving van would not have permitted her a stable standing position on the passenger's side seat pan. Although the precise position of Rachel Gray is unknown, the Lopez children report her as being near the passenger's side window. Blood stains most probably from Rachel Gray's head wound are found at approximately 15 and 21 inches above the seat pan on the passenger's side seat back (See Photo 1). The Lopez children would have observed both Barry Jones and Rachel Gray from an approximate 46 inch standing height (approximate eye level of Lopez children). The middle or lower torso of Rachel Gray in all probability would never have been observable through the windshield or driver's side window by the Lopez children at any time point while the Ford van was moving northeast through the Choice Market parking lot.

I served as the exemplar subject for Barry Jones (same height at approximately 5' 6" tall) within the Ford van. My arm length is approximately 25 inches. My opinion in this matter is that viewing the head and upper torso/shoulders of Barry Jones and the head of Rachel Gray through the Ford van windshield from 40 feet or 60 feet from a height of 46 inches presents a poor view. Photos taken on October 27, 2009 make this point and are included in Appendix I of this present report. Mr. Paul Gruen's modeling analysis also illustrates this point. Differences in the ground surface grade of the Choice Market lot versus the police impound lot do not make a significant difference in the children's visual observation. As the Ford van passed between the Lopez children and Choice Market, Reynaldo and Laura Lopez's view of vehicle occupants Barry Jones and Rachel Gray would have been through the driver's side window (approximate 26 foot displacement [distance]). Only Rachel Gray's head-face would have been observable by the Lopez children during this time frame. If Barry Jones was sitting in a normal driving position, the Lopez children would have had a good view of the upper torso and head of Barry Jones through the glass window regardless of their low visual perspective (46 inches from ground level). However, this position precludes Barry Jones from being able to strike Rachel Gray given the width of the van's interior of 72 inches (right to left windowsill displacement). As may be observed in Photo 2 of the exemplar model (P. Hannon), Barry Jones would be required to lean significantly over to his right in order to execute a backhand fist or even further for a backhand elbow to the head or torso of Rachel Gray. An extreme lean actually involved me moving my buttocks over the edge of the driver's seat pan during my reach. Driving this Ford van in this position with continued accelerator/brake and steering vehicle input would have required exceptional skill. It would have been an extremely awkward position for Barry Jones. These hypothesized actions by Barry Jones while driving the Ford van are extremely improbable. Furthermore, Reynaldo and Laura Lopez more probably than

not had less than three and one-half seconds to observe all the actions of Barry Jones and Rachel Gray through the windshield and subsequently the driver's side window.

## **Injury Biomechanics**

### **Abdominal Trauma**

Dr. Mary Pat McKay has opined that the fatal injury to Rachel Gray involved a perforation of the third portion of the duodenum as it passes through the retroperitoneum. The mechanics of this injury are thought to result from an increase in gas/fluid pressure due to an abdominal blow (compressed volume) of sufficient magnitude producing a rupture lesion. Hollow organs are more resistant to compression in general (Hannon, 2006 pp. 151-158). An alternative explanation as discussed by Dr. Mary Pat McKay indicates that a compressive blow to the abdomen results in a shear stress which moves the vertical section of the duodenum away from its boney attachment on the spine resulting in a retroperitoneal tear. One or both of these injury mechanisms may have been operative in Rachel Gray and Drs. Mary Pat McKay and Janice Ophoven have indicated that due to the nature of this fatal injury, it was inflicted not hours but rather days before May 2, 1994 (day of documented death). Tolerance limits have not been established for this biomechanical insult to the abdomen in children and are limited in adults (e.g. Geoghegan and Brush, 1956). Although not based upon empirical data, one certainly would not expect the soft tissue structural abdominal anatomy of a four year old underweight child to offer nearly as much resistance to a blow when compared to an older child of normal weight.

An exemplar pry bar with a mass of 660 grams was acquired by investigator Sowards and sent to my office. My understanding is that this exemplar pry bar (see Photos 3 and 4) is very similar to the pry bar belonging to Barry Jones. Although the linear ecchymosis of the upper right abdominal quadrant is a pattern injury apparent at the autopsy in Rachel Gray, it is my opinion that this pattern injury trauma is not a match for the dimensions of the exemplar or the actual subject pry bar (belonging to Barry Jones). Furthermore, a blow by this exemplar implement would have been a highly focal point impact and if a blow delivered by this instrument were sufficient to produce a duodenum perforation lesion, it would have also certainly produced an abdominal laceration most probably penetrating significantly into the superficial abdomen of Rachel Gray. One can readily see how sharp this pry bar is at its straight end or hooked end. When the force of a blow required to rupture the third portion of the duodenum is imposed by an adult swinging this pry bar, it would certainly have

penetrated and cut through the skin, underlying fat tissue, connective tissue and muscle tissue of Rachel Gray. No such trauma evidence existed at autopsy in Rachel Gray. The third portion of the duodenum located near the vertebral spine is protected by these overlying tissues and by more anterior (front of body) organs. A sharp focal point implement with enough velocity to produce duodenum rupture will absolutely produce more significant injury than what we see in the right side abdominal pattern injury of Rachel Gray at autopsy.

One case study of a 3 year old child does indicate that reported minor blunt trauma resulted in a complete rupture of the duodenum just proximal to the vertebral column without injury to neighboring parenchymatous organs (Saxena, A. and van Tuil, C. ; 2007). This last finding is consistent with the review of the medical literature by Dr. Mary Pat McKay in that blunt trauma producing rupture or perforation of the duodenum (as opposed to focal point trauma) does not produce noticeable abdominal bruising (Dr. Mary Pat McKay report of Oct. 29, 2009; p. 5). However, a significant sharp focal point blow produced by an implement such as a pry bar would also have the highest probability of producing severe trauma to parenchymatous organs such as the pancreas and the liver. Although Rachel Gray did have some hemorrhage around the head of her pancreas (most probably due to duodenum perforation) and a contusion of her transverse colon, much more severe organ trauma would have been expected with a forceful blow produced by a pry bar implement and such trauma was not present at the autopsy of Rachel Gray. The actual deep injuries of Rachel Gray are however, completely consistent with blunt force trauma produced by a significant momentum vector (mass x velocity with direction). Such a momentum vector could have resulted from a kick, a foot stomp, or a punch from a fist. Accidental trauma can not be ruled out from a biomechanics perspective. However, the overall evidence strongly suggests a battered child syndrome in this subject case and therefore accidental abdominal trauma seems improbable. Although it does appear that Rachel Gray was struck by a moving implement at some point in time that did produce a specific abdominal pattern injury, this specific blow is not the blow that produced the duodenum lesion and subsequent death of Rachel Gray (See Photo 5 and 6).

### **Scalp Wound**

In agreement with Dr. Janice Ophoven, from a biomechanics perspective, my opinion is that the scalp wound was most probably the result of her head coming in contact with a flat surface (e.g. fall) or alternatively the head of Rachel Gray was struck by a moving implement (focal point impact) resulting from a relatively low load (low force level). A strike against a flat surface produces a lateral clamp compression injury

mechanism and the area of bleeding can be small with a curved skull coming in contact with a flat surface such as, but not limited to the ground. The scalp becomes compressed between the bony skull and the stiff ground surface (i.e. lateral clamp).

A crow bar or a 660 gram pry bar swung by an adult is not a good match for this scalp injury. The load magnitude of such a strike would most probably produce much more significant injury to Rachel Gray including a significantly depressed skull fracture. Finally, no blood was found on the pry bar belonging to Barry Jones (Oct. 20, 1994 Scientific Examination report Ed Lukasik; pp. 2-3).

### **Conclusions:**

- The observations and statements of Laura and Reynaldo Lopez (age eight years at the date of the incident) are not accurate. Accurate observations for reasons discussed are highly improbable. Furthermore, the physical actions of Barry Jones described by the two Lopez children while he was driving the Ford van are extremely improbable from a functional anatomy/biomechanics perspective.
- The pattern injury on the abdomen of Rachael Gray after her death is not a good match for the pry bar and most importantly, the abdominal trauma “pattern injury” which did occur to Rachel Gray at some previous point in time is certainly not responsible for the rupture of the third portion of the duodenum in Rachel Gray.
- The scalp wound was not produced by an adult swinging an implement such as a crow bar or pry bar.

These opinions are based upon a reasonable degree of biomechanical and functional anatomy probability and certainty.

10

**PHOTO 1**



**PHOTO 2**

11

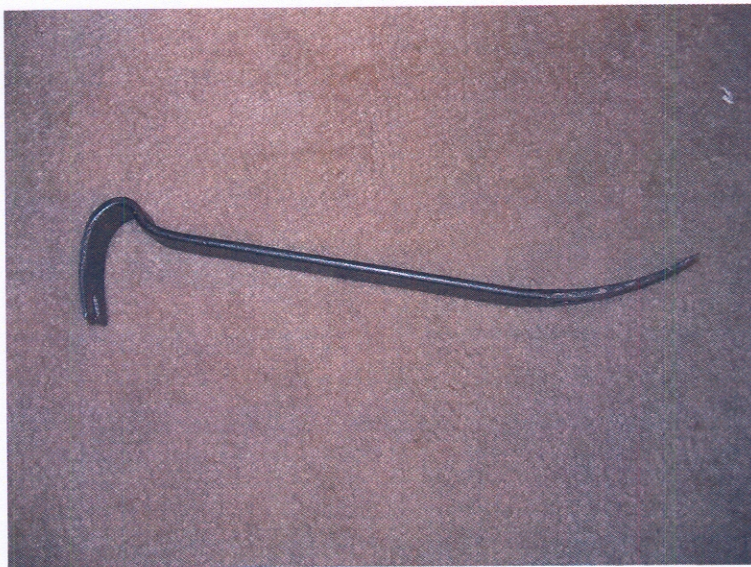


PHOTO 3



PHOTO 4

12



13

PHOTOS 5 AND 6



859



860

## REFERENCES

Please note that the references below have been reviewed by this expert. When specific data are cited, a footnote is provided.

Anthropometry of infants, children, and youths to age 18 for Product Safety Design Final Report May 31, 1977, Highway Safety Research Institute, The University of Michigan Ann Arbor, Michigan

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**Appendix I**

**Additional Photos**

**Line of Sight Views of the Lopez children of the Ford Van**

**October 27, 2009**